

REMARKS

The foregoing amendments in claim 1 define the invention with enhanced specificity to distinguish more clearly over the prior art. Also, reference numbers in the now pending claims 1-3 and 7 are deleted to conform to standard U.S. practice.

Claim 1 now includes subject matter that had appeared in claim 6, which is now cancelled, as are apparatus claims 4 and 5 and method claims 8 and 9.

Support for the other amendments in claim 1 can be found at paragraphs [0022], [0023] and [0058] of the specification herein, particularly page 27, lines 16-19, and in Fig. 7B.

Claim 3 is also amended to be consistent with the amended claim 1 from which it depends.

The present invention relates to a submount for a light emitting/receiving device that has a light-passing opening from a device-side to an outer, opposite side. The opening is coated with a metallic reflective material. As amended, claim 1 is directed to features that ensure that the brazing material that adheres the device to the submount does not adversely affect this reflective layer. The invention provides a low cost submount with good light transmission efficiency, heat dissipation and power usage.

Applicant respectfully traverses the rejection of claims 1-2 and 6-8 under Section 102(e) and of claims 3-5 and 9 under Section 103(a) in view of U.S. Patent No. 6,898,340 ("Tanaka") as well as the rejection of claims 3-5 and 9 under Section 103(a) in view of Tanaka combined with U.S. Patent No. 7,057,697 to Liu ("Liu").

Tanaka describes a monocrystalline silicon substrate 20 for an LED 10 formed as a GaN-based semi-conductor laminate 40 in a depression 21 on face 20a of the submount. An opening 31 extends from face 20a (at the depression 21 and the LED 10) to the opposite face 20b with a frusto-conical shape, one widening toward face 20b.

The focus of Tanaka is that one can use a silicon substrate as a base for a GaN semiconductor diode despite the light-impervious nature of silicon (Tanaka, Col. 1, lines 52-55). Tanaka fills this opening 31 with a resin 32 that serves as a light guide. Filling the opening 31 is contra-indicated for heat dissipation.

Turning to applicant's claim 1, as amended, a dielectric film is formed on the mounting surface which surrounds the device-side opening, an electrode is formed on the dielectric film, and an inner end portion of the electrode is spaced at a specified distance from the device-side opening. Because the inner end portion of electrode is spaced at a specified distance from the device-side opening, the dielectric film is exposed around the device-side opening, as best seen in Fig. 7B, and discussed on page 27, lines 16-19 of the specification.

These features are not taught or suggested by the cited references. They are important to protect the reflective surfaces from the diffusion of brazing material 43 when the light emitting/receiving device is heated to be fixed to the electrode on the dielectric film. When the light emitting/receiving device is fixed to the electrode on the dielectric film using a conductive adhesive material such as a brazing material, it is possible to prevent the adhesive material from flowing into the reflecting surface via the device-side opening because the inner end portion of electrode is spaced at a specified distance from the device-side opening.

The commonly-used dielectric film is typically made of SiO₂. Brazing material dispersed in organic solvent or made of AuSn is used as the adhesive material so as to fix the light emitting/receiving device to the electrode. Those brazing materials have poor wettability to the dielectric film of SiO₂ which has a hydrophilic property. However, even if the brazing material gets into touch with the dielectric film of SiO₂ over the electrode, the construction defined by amended claim 1 prevents the adhesive material from flowing or diffusing into the reflecting surface via the device-side opening. As noted above, the spacing of the inner end portion of electrode at a specified distance from the device-side opening operates, in the defined structural context, to create this result.

In short, these claimed structural features of amended claim 1 prevent from contamination of the reflecting surface and therefore from decrease in reflectivity of the reflecting surface. These structural features of amended claim 1 and the effects of these features discussed above are neither disclosed nor suggested by the cited references US 6,898,340 to Tanaka and 7,057,697 to Liu, whether taken alone or in combination.


Applicant notes that the prior Office Action does not check off priority to the corresponding Japanese application. The U.S. Declaration, the preceding PCT application, and the Official Filing Receipt herein all note the priority. Applicant requests that the claim of priority be acknowledged and confirmed.

Applicant submits herewith a Request for a one-month extension of time to and including January 11, 2008, together with an authorization to charge our Deposit Account for the requisite fee.

In view of these amendments, Applicants believe that all of the remaining, pending claims 1-3 and 7 are clearly patentable over the art of record, and that this application is otherwise in condition for allowance.

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Respectfully submitted,

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